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REMARKS

In view of the above amendment and the following discussion, the Applicants submit that none of the claims now pending in the application are unpatentable or anticipated under the provisions of 35 U.S.C. §§ 101, 112 and 102. Thus, the Applicants believe that all of these claims are now in allowable form.

I. REJECTION OF CLAIMS 1-22 UNDER 35 U.S.C. § 101

The Examiner rejects claims 1-22 for being directed to non-statutory subject matter under 35 U.S.C. § 101. The Applicants respectfully submit that the limitation of storing a data structure in a memory and processing said data structure to identify a set of hierarchical heavy hitter nodes among a plurality of nodes are useful, concrete and tangible, thereby fully satisfying the requirements of 35 U.S.C. § 101.

Moreover, the Examiner asserts that the useful, concrete and tangible result of processing said data structure is unknown if the limitations in independent claims 1, 9 and 15 are not true (i.e. if a set of hierarchical heavy hitter nodes among a plurality of nodes being less than a fraction of the number of elements in said set of elements.) (See Office Action, Section 3, emphasis in original.) The Applicants respectfully submit that the Applicants are not required to claim each and every possible permutation of outcomes to satisfy the requirements of 35 U.S.C. § 101.

The requirements of 35 U.S.C. § 101 are that the claims be any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof. (See MPEP, 2106(IV)(A).) Applicants respectfully submit that independent claims 1, 9 and 15 recite a new and useful process, machine or manufacture that are statutorily patentable under 35 U.S.C. § 101.

Furthermore, to satisfy 35 U.S.C. § 101, the claim must produce a useful, concrete and tangible result. (See MPEP, 2106(IV)(C)(2)(2).) Applicants respectfully submit that storing a data structure in a memory and processing said data structure to identify a set of hierarchical heavy hitter nodes among a plurality of nodes are useful, concrete and tangible, as discussed above. Nowhere within the requirements of 35 U.S.C. § 101 or the MPEP does it require that the Applicants claim each and every possible permutation of outcomes.

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The Applicants are only claiming the exemplary condition of processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements, as positively recited in claims 1, 9 and 15. What the Applicants do not claim, i.e. an alternate path of the method or process, cannot be a proper basis for a rejection under 35 U.S.C. § 101. Therefore, the Applicants respectfully submit that claims 1-22 fully satisfy the requirements of 35 U.S.C. § 101 and are patentable thereunder.

II. REJECTION OF CLAIMS 1-22 UNDER 35 U.S.C. § 112

The Examiner rejected claims 1-22 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Applicants respectfully traverse the rejection under such assumption.

The Examiner alleges the clause "a data structure" and "set of elements" render claims 1, 9 and 15 indefinite because it is not clear what are "a data structure" and "set of elements". The Applicants respectfully submit that "a data structure" is well known by one skilled in the art of data processing. Moreover, "set of elements" is also well known by one skilled in the art of data processing. In addition, the relationship between "a data structure" and "set of elements" is well defined by the claims as written and fully supported by the Applicants' specification on at least page 8, paragraph [0023].)

The Examiner alleges the clause "frequency data" renders claims 1, 9 and 15 indefinite because it is not clear what "frequency data" is. In response, Applicants herein amend claims 1, 9 and 15 to clarify "frequency data" to read "frequency count data".

Moreover, the Examiner asserts, similar to the reasoning for a rejection under 35 U.S.C. § 101 stated above, that claims 1, 9 and 15 are indefinite because it is unclear what will happen if one of the conditions within claim 1, 9 and 15 are not met. Again, the Applicants respectfully submit that the Applicants are not required to claim each and every possible permutation of outcomes. Applicants only claim an exemplary condition

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of processing said data structure to identify a set of hierarchical heavy hitter nodes among a plurality of nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements, as positively recited in claims 1, 9 and 15. Therefore, the Applicants respectfully submit that claims 1, 9 and 15 fully satisfy the requirements of 35 U.S.C. § 112 and are patentable thereunder. As such, the Applicants respectfully request the rejection be withdrawn.

Moreover claims 2-8, 10-14 and 16-22 no longer depend from rejected claims 1, 9 and 15 in view of the arguments above. Therefore, Applicants respectfully request the rejection to claims 2-8, 10-14 and 16-22 also be withdrawn.

III. REJECTION OF CLAIMS 1-4, 6-12, 15-18 and 20-22 UNDER 35 U.S.C. §102

A. Claims 1-4, 6-12, 15-18 and 20-22

The Examiner rejected claims 1-4, 6-12, 15-18 and 20-22 as being anticipated by Greenwald, et al. ("Space-Efficient Online Computation of Quantile Summaries", published on 2001, hereinafter referred to as "Greenwald"). The Applicants respectfully traverse the rejection.

Greenwald teaches space-efficient online computation of quantile summaries. In other words, a quantile summary consists of a small number of points from the input data and the quantile summary is used to estimate approximate responses to any arbitrary quantile query. (See Greenwald, sec. 1.)

The Examiner's attention is directed to the fact that Greenwald fails to teach or suggest the novel concept of processing a data stream comprising storing a data structure in a memory and processing said data structure to identify a set of hierarchical heavy hitter nodes among a plurality of nodes, as positively recited by the Applicants' independent claims 1, 9 and 15. Specifically, Applicants' independent claims 1, 9 and 15 recite:

1. A method of processing a data stream, comprising:
receiving a set of elements of said data stream;

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storing a data structure in a memory, said data structure configured to represent said set of elements as a hierarchy of nodes, each of said nodes having frequency count data associated with one of: an element in said set of elements or a prefix of an element in said set of elements; and

processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements. (Emphasis added.)

9. Apparatus for processing a data stream, comprising:
means for receiving a set of elements of said data stream;
means for storing a data structure configured to represent said set of elements in a memory as a hierarchy of nodes, each of said nodes having frequency count data associated with one of: an element in said set of elements or a prefix of an element in said set of elements; and
means for processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements. (Emphasis added.)

15. A computer readable medium having stored thereon instructions that, when executed by a processor, cause the processor to perform a method of processing a data stream, comprising:

receiving a set of elements of said data stream;
storing a data structure in a memory, said data structure configured to represent said set of elements in a memory as a hierarchy of nodes, each of said nodes having frequency count data associated with one of: an element in said set of elements or a prefix of an element in said set of elements; and
processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements. (Emphasis added.)

In one embodiment, the Applicants' invention teaches a method of processing a data stream comprising storing a data structure in a memory and processing said data structure to identify a set of hierarchical heavy hitter nodes among a plurality of nodes. For example, the Applicants' invention may be used in network-aware clustering applications. (See, for example, Applicants' specification, para. [0015], [0017].)

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In contrast, Greenwald fails to anticipate Applicants' invention because Greenwald fails to teach or to suggest processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, as positively claimed by Applicants' independent claims. Greenwald only teaches space-efficient online computation of quantile summaries. (See Greenwald, sec. 1.) Therefore, Greenwald fails to anticipate Applicants' independent claims 1, 9 and 15.

Moreover, dependent claims 2-4, 6-8, 10-12, 16-18 and 20-22 depend, either directly or indirectly, from independent claims 1, 9 and 15, respectively, and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 2-4, 6-8, 10-12, 16-18 and 20-22 are also patentable and not anticipated by Greenwald. As such, the Applicants respectfully request the rejection be withdrawn.

B. Claims 1-4, 6-12, 15-18 and 20-22

The Examiner rejected claims 1-4, 6-12, 15-18 and 20-22 as being anticipated by Manku, et al. ("Approximate Frequency", 2002, hereinafter referred to as "Manku"). The Applicants respectfully traverse the rejection.

Manku teaches approximate frequency counts over data streams. Manku teaches algorithms for computing frequency counts exceeding a user-specified threshold over data streams that have small memory footprints. (See Manku, Abstract.)

The Examiner's attention is directed to the fact that Manku fails to teach or suggest the novel concept of processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements, as positively recited by the Applicants' independent claims 1, 9 and 15. (See *supra*.)

In one embodiment, the Applicants' invention teaches a method of processing a data stream comprising processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said

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hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements. For example, discounting any portion thereof attributed to a descendant hierarchical heavy hitter node may prevent finding heavy hitters over all prefixes of all elements, thereby, preventing the return of too much information. (See Applicants' specification, para. [0021].)

In contrast, Manku fails to anticipate Applicants' invention because Manku fails to teach or to suggest a method of processing a data stream comprising processing said data structure to identify a set of hierarchical heavy hitter nodes among said nodes, said frequency count data of each of said hierarchical heavy hitter nodes, after discounting any portion thereof attributed to a descendant hierarchical heavy hitter node in said set of hierarchical heavy hitter nodes, being greater than or equal to a fraction of the number of elements in said set of elements, as positively claimed by Applicants' independent claims. Manku only teaches algorithms for computing frequency counts exceeding a user-specified threshold over data streams that have small memory footprints. (See Manku, Abstract.) Therefore, Manku fails to anticipate Applicants' independent claims 1, 9 and 15.

Moreover, dependent claims 2-4, 6-8, 10-12, 16-18 and 20-22 depend, either directly or indirectly, from independent claims 1, 9 and 15, respectively, and recite additional limitations. As such, and for the exact same reason set forth above, the Applicants submit that claims 2-4, 6-8, 10-12, 16-18 and 20-22 are also patentable and not anticipated by Manku. As such, the Applicants respectfully request the rejection be withdrawn.

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Conclusion

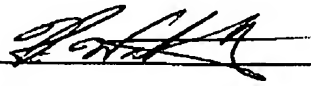
Thus, the Applicants submit that all of these claims now fully satisfy the requirements of 35 U.S.C. §§ 101, 112 and 102. Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the issuance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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